



## RUNWAY SAFETY SOUTHWEST REGION

A periodic publication prepared by the Runway Safety Program Office

*Runway Incursions average more than one per day.  
Pilot awareness is the key to safe operations at towered airports.*

### The Human Factor

#### The Major Factor in Runway Incursions is Human Error

Superficial causes tell you how incidents happen. Underlying causes tell you why incidents happen.

Runway incursions are caused by a number of failures including the failure to understand where the airplane is, where the runway is and where a vehicle is. The classic failure is *Situation Awareness*.

These failures involve three different organizations: Pilots, Air Traffic Controllers (arrival, departure and ground) and airside vehicle staff. Why do these accidents happen? For starters, the equipment breaks down or doesn't work, or the equipment isn't fit for the purpose. People can be incompetent, distracted, careless or reckless. The organization can allow the failure to propagate and the accidents waiting to happen have been accepted.

Latent conditions and underlying causes represent accidents waiting to happen. There are many problems that have been identified. Poor procedures could be used which are unknown or out-of-date. There could be poor airport geometry and bad design accepted. Commercial pressures may not be well balanced. The organization may be incapable of supporting the operation. Maintenance may be poorly scheduled. Latent conditions make errors more likely or the consequences worse.

Classic solutions include better ground radar, especially for poor visibility and extra aircraft systems (moving map displays). More rigid procedures could be used in the cockpit and in the tower. There could be more training and supervision in the tower. There could be more data collection and analysis of existing incidents and more attention to those causing the problem. In addition, there could be technical solutions to ensure nothing goes wrong.

However, this classic approach is not always effective! There are problems with this approach in that analysis implies having a framework to *understand* what is happening. It has been shown that analysis and investigation lead to paralysis. There can be paralysis by analysis and the action can be delayed until effectiveness is proven.

By analyzing actual incidents, such as the SQ 006 (747-400) flight at Taipei, or the Schiphol DAL 39 (Delta 76) flight at Amsterdam, there is much to be learned. Initial analyses show the pilots and controllers to have been at fault with situation awareness failures. Deeper investigation begins to show that in both cases they were accidents waiting to happen. The individuals were victims of systematic failures. In neither case was

there any effective safety management as expected in other high hazard industries. Few technical solutions would have been necessary if what *should* have been done was done.

Conclusion: Runway incursions appear to be due to individual errors. The individual errors seem to be caused by system weaknesses. Most major incidents have minor precursors. Most problems can be avoided by application of safety management principles that include risk assessment, audit programs and continuous improvement learning from errors.

[Note: This article is a summary of a presentation by Patrick Hudson, Center for Safety Studies, Leiden University, The Netherlands.] For the complete presentation refer to the following website:  
[www.eurocontrol.int/eatmp/events/runway.html](http://www.eurocontrol.int/eatmp/events/runway.html)

## Where is Taxiway Alpha 3?

When I first began my flying career many, many years ago, most airplanes did not have a radio. Indeed, most did not even have an electrical system. Finding one's way around an airport was a form of pilotage. If you were at an unfamiliar airport, you just did the best you could to find the end of the active runway. Some airports had signs that were meant to help the transient pilot, but even those were not standard. Most just pointed the way to a given runway, with no taxiway designations. More often, there were no useful signs at all. Certainly, the non-airline pilot could not refer to a useful taxi chart.

Things have changed since the good old days. Now we have standard signage from one airport to the next. We are probably talking to Ground Control, who can help with progressive taxi instructions. Taxi charts are available for almost all airports.

If this is the case, then why do we still have aircraft wondering onto active runways and causing runway incursions? There is no single, simple answer. However, the single thread that connects the many incursion incidents is: **pilot confusion**. Which taxiway am I on? Which one should I be on? Where is the active runway from my present position? Did I just cross a hold-short line? Is it for an active or non-active runway?

My suggestion is simply this: Before taxiing, have a taxi diagram in hand. Before landing at any airport larger than a single-runway rural strip, have a taxi diagram in hand. Most professional pilots already are in the habit of using taxi diagrams. It is probably required by their employer or standard operating procedures.

We private flyers should and must do the same. Have the taxi diagram in hand and use it. Before moving from the chocks, be sure you understand which route to take and which runways are in use. Be especially careful at airports that require crossing an active runway to a taxiway on the other side to reach the full-length take-off end. Yes, there are still some of those around. Efforts are underway to construct more taxiways that will avoid such crossings, but this takes time and money.

Before landing, have the taxiway diagram handy and be sure you know which side of the runway to expect a turnoff. Review the route you will probably take to reach the parking ramp or the FBO. After landing and turning off, follow your taxi progress on the chart so that you know exactly where you are at all times.

Only by completing these preparations and by giving navigation on the ground the same attention we give navigation in the air, can the general aviation community do our part to improve the runway incursion problem.

[Article submitted by Chuck Dawson, ASW-255]

## Help Yourself and Other Pilots by Helping the Controller

When a Ground Controller or Local Controller gives you instructions to hold short of a specific runway, the controller is mandated to receive an acknowledgement from the pilot including all of the hold short instructions. Example:

The Ground Controller issues you a taxi clearance: "November One Two Three Whiskey, Runway Three Six Left, taxi via Charley, hold short of Runway Three Six Right."

If you respond by saying "November One Two Whiskey, Roger,"  
The controller has to reply by saying:  
"November One Two Whiskey READ BACK HOLD INSTRUCTIONS."

If you respond by saying "November One Two Whiskey, Roger we'll hold short,"  
The controller has to reply by saying:  
"November One Two Whiskey READ BACK HOLD INSTRUCTIONS."

In other words, the controller has to hear you say:  
"November One Two Whiskey, will HOLD SHORT OF RUNWAY THREE SIX RIGHT."

This will help the controller, and also help you and other pilots by reducing frequency congestion and expediting your departure.

Thanks for listening. We'll be listening for you!

[Article submitted by Bill Tilk, ASW 505]

## Taxiway Intersections

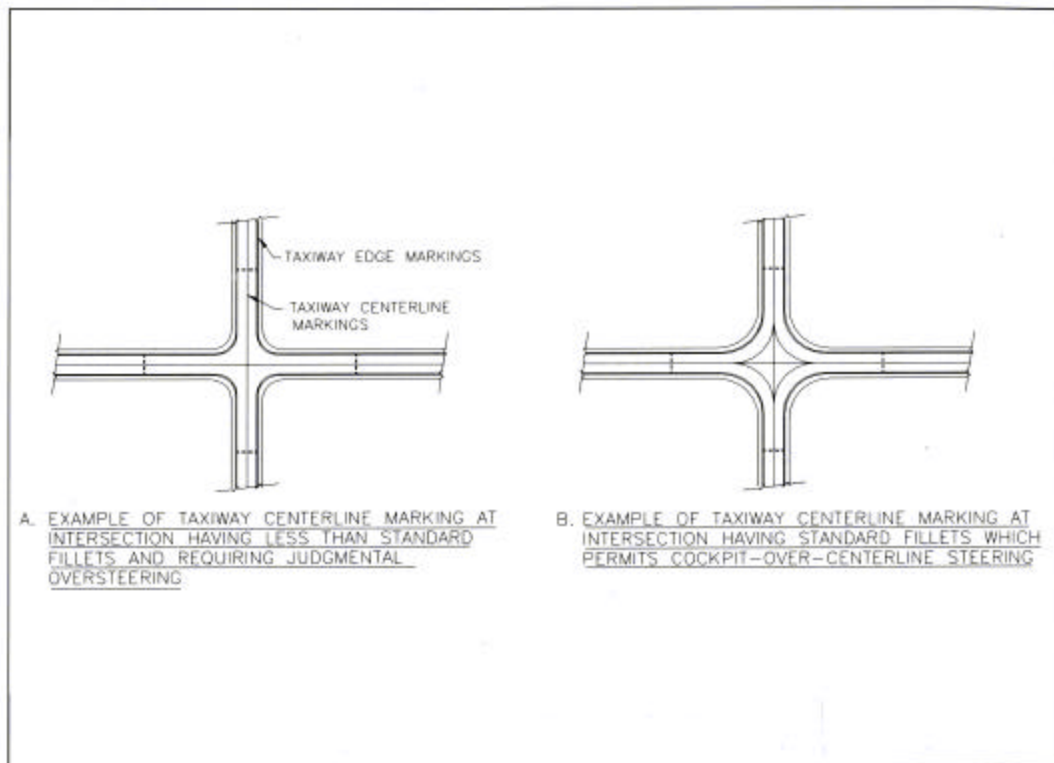
This particular issue came into play a couple of years ago at DFW Airport, when the freight hauler did not follow the taxiway centerline on Taxiway WK to Taxiway F and ended up on Taxiway F-2, a high-speed exit, and ended up on Runway 18L at night, causing an incursion with an American F100.

**Taxiway Intersections**. When taxiing, pilots need to be aware that taxiway intersections are marked in one of two ways depending on the presence pavement fillets. Having knowledge of how intersections are marked is of importance to pilots of smaller aircraft who are negotiating expanses of airport pavement designed and marked to accommodate larger and more demanding aircraft. These design and marking methods are referred to as *Judgmental Oversteering* and *Cockpit Over Centerline*.

**A. Judgmental Oversteering**. On taxiways where judgmental oversteering is required, the centerline continues straight through the intersection as shown in Figure A. Judgmental oversteering requires complex maneuvering, and increases the risk of aircraft excursions from the pavement due to width for its most demanding aircraft.

**B. Cockpit Over Centerline**. Taxiway intersections where adequate fillets exist, as determined by the most demanding aircraft, the centerline follows the taxiway curve as shown in Figure B. Cockpit over

centerline steering enables more rapid movement of traffic with minimal risk of aircraft excursions from the pavement surface.



[Article submitted by Bruce Kirkendoll, ASW 620]

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